IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

#14

In re application of:

Hiramitsu et al.

Serial No.: 09/807,960 Art Unit: 1775

Filed : May 18, 2001 Examiner: Cathy Lam

Title : Ceramic substrate

DECLARATION UNDER RULE 132

Honorable Commissioner of Patents and Trademarks,
Washington, D.C. 20231

Sir:

I, Atsushi Osaki, a citizen of Japan and having postal mailing address of IBIDEN CO., LTD. 1-1, Kitagata, Ibigawacho, Ibi-gun, Gifu 501-0695 JAPAN, declare and say that:

March, 2000, I received a Doctor's degree (Doctor of Science) at the graduate school of science, Kyoto University.

From August, 2000, up till the present, I have been employed by IBIDEN Co., LTD, and engaged in the works of research and development for ceramics in Technology Development Division;

I have read the Official Action mailed and the references cited therein. I am familiar with the subject matter of the above-identified invention, together with the inventor of 09/807,960, Yasutaka Ito, and declare that I carried out the following experiments under the direction of Yasutaka Ito.

I respectfully submit herewith my exact report thereon;

NOTE

1. Object of the experiment

To show the presence of pores in alumina ceramic described in the reference cited (US 5,279,886) in the Official Action of rejection from United States Patent and Trademark Office by service, and to measure the number of pores.

2. Content of the experiment

(1) 100g of alumina ceramic (containing CaO, BaO, MgO, SiO_2 as impurities) with purity of 97%, 2g of 3mol% yttrium-stabilized zirconia, 15g of acryl binder, and 100g of ethyl ether were mixed and kneaded to produce a paste.

(2) The paste was coated on an acryl film by doctor blade method, and dried at 80℃ for 3 hours to give a green sheet of 20μm in thickness.

(3) Then Pt paste comprising zirconia powder and Pt powder was printed on the green sheet to obtain a heating element.

(4) Furthermore, the green sheet was covered and pressurized at a pressure of 50kg/cm^2 to be integrated.

(5) The resultant was sintered at 1475℃ for 4 hours in atmosphere.

3. Result of the experiment

(1) Figure 1(on the attached sheet) is a sectional view of the heater. A composite layer of platinum and zirconia exists at the center and layers of alumina are formed on both side of the composite layer.

(2) Large pores (closed pores) are formed in the alumina layer.

(3) Figure 2(on the attached sheet) is an enlarged photograph of the alumina layer. There are at least 54

pores having a diameter of 0.5 μm or more. The size of the screen is 4.5μm in length and 6.3μm in width, and the area of it is $28.35\times10^{-12}m^2$. Calculation from these indicates that there are at least 19.0×10^{11} pores $/m^2$ in number.

54 pores / $28.35\times10^{-12}\ m^2$

I declare further that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

Signed this July 25, 2002

Atsushi Osaki

Atsushi Osaki

Attachment